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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

FULLER, RODNEY EVAN

ART UNIT PAPER NUMBER

2851

DATE MAILED: 01/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/899,566

Examiner

Rodney E Fuller

Applicant(s)

PRIL ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 July 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

In the Office Action, mailed October 7, 2002, the examiner (Christopher Young) set forth a restriction requirement of two groups:

- (I) Claims 1-25 and 31, drawn to an apparatus, classified in claims 35, subclass 18.
- (II) Claims 26-30, drawn to a method, classified in class 430, subclass 30.

In applicant's Response To Restriction Requirement, dated October 16, 2002, the applicant provisionally elected Group I (claims 1-25 and 31) with traverse.

Subsequently, the application was transferred to the current examiner. The examiner has reconsidered the relationship between the claims and withdraws the restriction requirement.

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the following items as described in the specification:

- a. "adjusting means AM" (page 12, paragraph 0034)
- b. "the light source LA may be within the housing of the lithographic projection apparatus" (page 13, paragraph 0035)

Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "second harmonic interferometer

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having operating wavelengths λ_2 and λ_3 " set forth in claims 9, 12, 15, 27-29 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 20 is objected to because of the following item(s):
- i. Claim 20 recites the limitation " λ_2 and λ_3 " in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 16, 20-26 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyaji, et al. (US 5,559,584).

Regarding claims 1, 16 and 26, Miyaji discloses "a radiation system (Fig. 1, ref.# EXL) to provide a projection beam of radiation; patterning structure (Fig. 1, ref.# R1) to pattern the projection beam according to a desired pattern; a substrate table (Fig. 3, ref.#

2) to hold a substrate (Fig. 1, ref.# W); a projection system (Fig. 1, ref.# PL) to image the patterned beam onto a target portion of the substrate, a displacement measuring interferometer (Fig. 1, ref.# 6X, 6Y) having an operating wavelength λ_1 for measuring at least one of the position of said substrate table (Fig. 1, ref.# 2) and the position of a table which is part of said patterning structure; a purge gas source (Fig. 1, ref.# N2 GAS) to supply purge gas to a space (column 1, line 65), to displace therefrom ambient air, said space accommodating at least one of at least a part of said substrate table (column 2, lines 60-65) and at least a part of said table which is part of said patterning structure (column 2, lines 65-67), wherein said purge gas is substantially non-absorbent of said projection beam of radiation and has a refractive index at a wavelength λ_1 which is substantially the same as that of air when measured at equal wavelength, temperature and pressure (column 1, line 66) (note: Refractive index of air = 1.000292; refractive index of nitrogen = 1.00297 using $\lambda=589.3\text{nm}$, under 1 atm at 0 deg. C.)."

Regarding claim 2, Miyaji discloses "wherein the purge gas comprises two or more components selected from N2, He, Ar, Kr, Ne and Xe." (column 1, lines 52-53, i.e., N2 and He) Furthermore, as noted in Matsumoto (US 6,411,368) (column 38, lines 29-30), the inert gases include helium, neon, argon, krypton, xenon and radon. Thus, the selection of any of these known equivalents (i.e., inert gases) would be within the level of ordinary skill in the art.

Regarding claim 21, Miyaji discloses "...wherein said purge gas supply comprises a gas flow regulator (Fig. 2, ref.# RG) to control a rate of flow of purge gas to said space and a pump (column 4, line 8) to remove purge gas from said space."

Regarding claim 22, Miyaji discloses "...wherein said flow regulator comprises a flow restrictor." (column 5, lines 43-45)

Regarding claim 23, Miyaji discloses "...wherein said flow regulator comprises a blower." (column 5, lines 43-45)

Regarding claim 24, Miyaji disclose "...wherein said radiation of said projection beam has a wavelength less than about 180nm." (column 1, lines 11-14)

Regarding claim 25, Miyaji discloses "...wherein said radiation of said projection beam has a wavelength selected from the group comprising about 157nm and about 180nm." (column 1, lines 11-14)

Regarding claim 30, the "device" produced by the apparatus in Miyaji is identical to the device "manufactured according to the method of claim 26."

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 3-8 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyaji, et al. (US 5,559,584).

Miyahi discloses all the structure set forth in the claims except for the specific ratio of gas mixtures set forth in claims 3-8 as follows:

(claim 3): at least 95% by volume N₂ and at least 1% by volume Xe;

(claim 4): at least 95% by volume Ar and at least 1% by volume Xe;

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(claim 5): at least 90% by volume Ar and at least 5% volume Kr;

(claim 6): at least 95% by volume N₂ and at least 1% by volume Ne;

(claim 7): at least 50% by volume N₂ and at least 35% by volume Ar;

(claim 8): at least 94% by volume N₂, at least 0.5% by volume He and at least 0.5% by volume Xe;

Miyaji implies that the gases are mixed in a ratio close to that the refractive index is close to that of air in column 52-57. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the mixture ratio of gases as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105, USPQ 233.

Regarding claim 31, as noted above, the ratio of 95% N₂ and 1% Xe as set forth in claim 3 would be obvious to one of ordinary skill in the art.

8. Claims 9-15, 17-19 and 27-29 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyaji, et al. (US 5,559,584) in view of Henshaw, et al. (US 5,991,033).

Regarding claims 9, 12, 15 and 27-29, Miyaji discloses all the structure set forth in the claims except for "a second harmonic interferometer having operating wavelengths λ_1 and λ_2 to adjust measurements of said displacement measuring interferometer to substantially eliminate effects of variation in pressure and temperature." However, the use of "a second harmonic interferometer having operating wavelengths λ_1 and λ_2 " is routine in the art as is evident from the teaching of Henshaw (see abstract). Thus, it

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would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Miyaji by including "a second harmonic interferometer having operating wavelengths λ_1 and λ_2 to adjust measurements of said displacement measuring interferometer to substantially eliminate effects of variation in pressure and temperature." The ordinary artisan would have been motivated to modify Miyaji in the manner described above to reduce the error in interferometric measurements caused by the presence of an atmosphere along the measurement path of the interferometer system as disclosed by Henshaw in column 3, lines 17-21.

Further differences between modified Miyaji and the claimed invention are the specific ratio of gas mixtures set forth in claims as follows:

(claim 11): N₂ and/or Air at 50-90% by volume;

(claim 11): Xe and/or Kr at 0.5-40% by volume;

(claim 11): He and/or Ne at 2-20% by volume;

(claims 12, 15, 28 and 29): where $\alpha_{m1} / (\alpha_{m3} - \alpha_{m2}) = K_a$;

(claim 14): N₂, He, Ar and/or Ne at 65-99.5% by volume;

(claim 14): Kr and/or Xe at 0.5-35% by volume;

(claim 17): wherein K is defined by equation 22 on page 32 of the specification;

(claim 18): He at 95% by volume;

(claim 19): N₂ at 94-96% by volume and He at 4-6% by volume.

As noted above, Miyaji implies that the gases are mixed in a ratio close to that the refractive index is close to that of air in column 52-57. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the

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mixture ratio of gases as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105, USPQ 233.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Matsumoto (US 6,411,368) and Komoriya, et al. (US 5,025,284) each discloses that the inert gases include helium, neon, argon, krypton, xenon and radon.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney Fuller whose telephone number is (703) 306-5641. The examiner can normally be reached on Monday through Friday from 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams, can be reached on (703) 308-2847.

Rodney Fuller
Primary Examiner



January 23, 2003